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GROUP 250

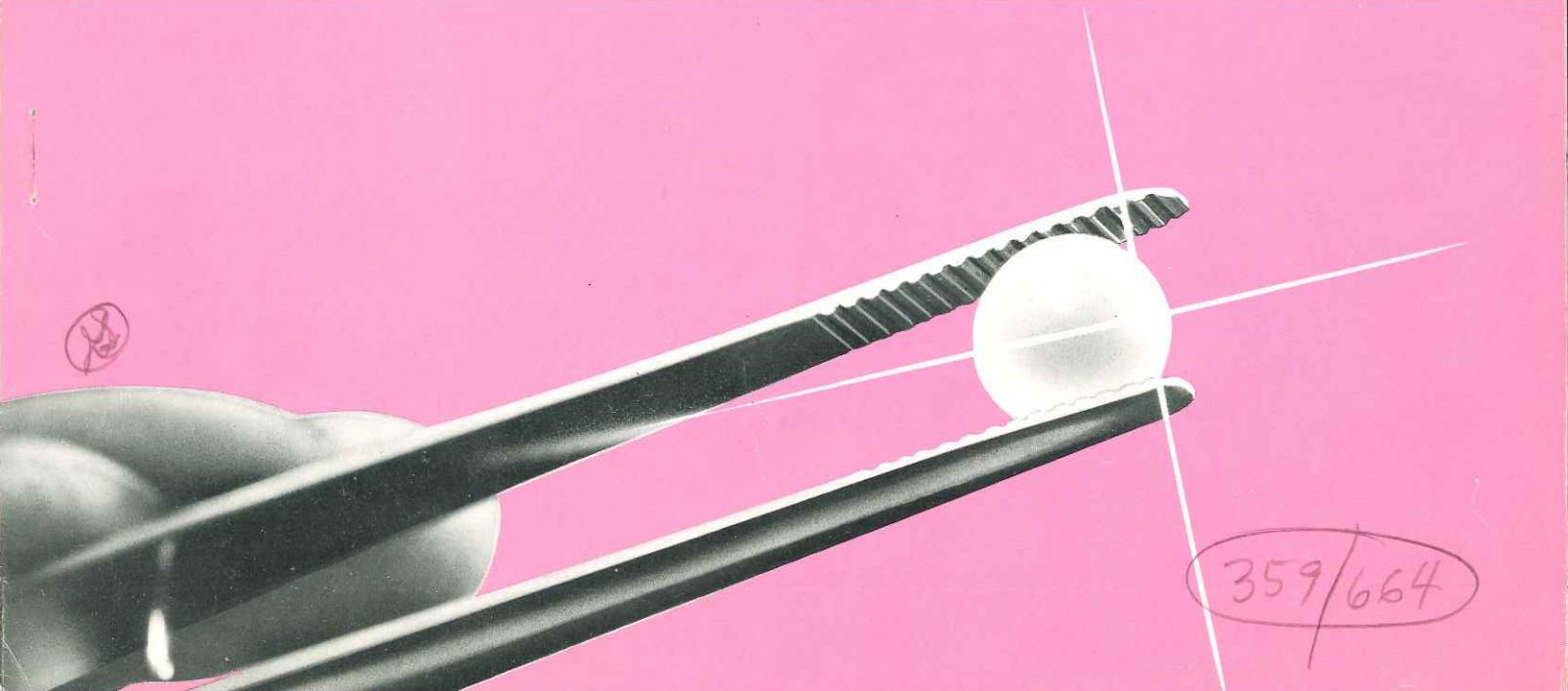
pootters  
technical  
quality  
glass beads

FOR INDUSTRIAL AND SCIENTIFIC APPLICATIONS

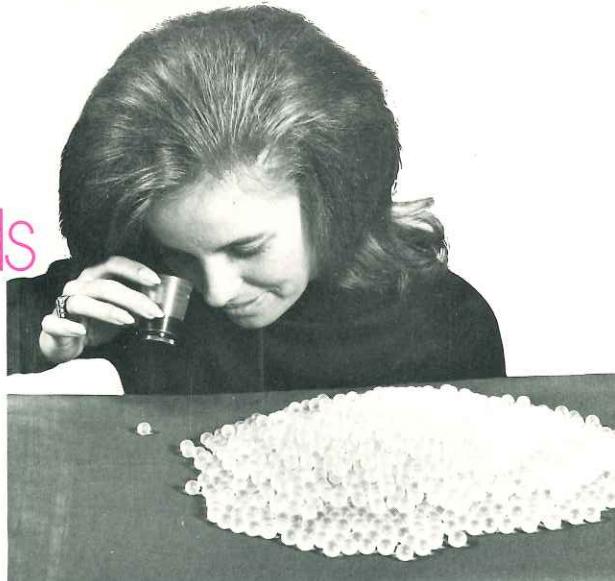
V SERIES (CROWN BARIUM)

P SERIES (SODA LIME)

H SERIES (HIGH DENSITY)



# potters technical quality glass beads



**manufactured  
to precise  
specifications  
to assure  
maximum  
reliability**

Potters Technical Quality Glass Beads are custom formulated, using specially selected materials, to provide certain properties, such as high degree of roundness, tight size gradations, minimum contamination and elimination of broken particles.

These special characteristics provide the controls necessary for precise results in a wide range of sensitive industrial applications—instrumentation, coating, filtration, electromechanical and electrochemical operations and many others. The potential uses are limited only by your imagination.

Technical Quality Glass Beads are available in three series: P Series (Soda Lime glass), V Series (Crown Barium glass), and H Series (High Density glass). Potters' Technical Service Group provides complete analytical and applications services to help you solve specific problems, meet process objectives, and prepare specifications and procedures.

## **V SERIES BEADS**

(CROWN BARIUM GLASS)

V Series beads are manufactured only from custom formulations of Crown Barium glass, a tough material which is used, among other applications, for shot peening where especially heavy particles are required. The beads are sized with high accuracy (minimum 90% within size) and are specially processed to minimize contamination and assure that there are virtually no broken particles. The beads are white or crystal clear in color and are free from visible surface films, contamination or grayness. Sizes available range from 16 mm to 1 mm (U.S. Sieve 18). Special size gradations, colors and custom coatings are also readily available.

## **P SERIES BEADS**

(SODA LIME GLASS)

P Series beads are manufactured from specially selected soda lime glass; they can be produced to custom formulations if required. They are specially processed for maximum roundness by an exclusive Potters' technique and can be graded to size-range accuracies as high as 98% between reasonable screen increments. The beads are white or crystal clear in color and are free from surface films, visible contamination or grayness. They are available in stock size ranges from 1190-707 microns (U.S. Sieves 16-25) to 105 microns and finer (U.S. Sieve 140). Special size gradations and custom coatings are frequently produced to provide the spherical material suited to a customer's specific needs.

## **H SERIES BEADS**

(HIGH DENSITY)

H Series beads are manufactured from a special formulation to provide a high refractive index of approximately 1.9. H Series beads are used for high intensity retroreflection or where material of higher density is required. Sizes, ranging from 841 microns to 74 microns, are graded with high accuracy. Manufacturing processes minimize contamination and assure that there are virtually no broken particles. The beads are white in color and are lead-free. Special size gradations and custom coatings are available.

## **STRINGENT QUALITY CONTROL**

To assure our customers that Technical Quality Glass Beads meet or exceed specifications, Potters' fully staffed Quality Control Laboratories use specialized laboratory test equipment to check every batch of beads for accuracy of size gradation, cleanliness, clarity, composition and coating uniformity (should it apply). Beads are tested in maximum 2,000 lb. lots. Lot samples and test results are retained and are available on request. In addition to our normal lot control procedures, where specifications are extremely critical, Potters' quality control personnel will coordinate with receiving inspection activities to assure mutual accuracy.

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**APPLICATIONS  
LIMITED ONLY BY  
YOUR IMAGINATION**

Precise retroreflection  
Instrumentation  
Coating  
Filtration  
Atomic Fuel for special purposes  
Battery spacers  
Chromatography  
Cleaning of conduits or tubing  
Decoration  
Enamelizing  
Encapsulation  
Fillers and extenders  
Filter performance testing  
Fluidizing  
Greeting card decoration  
Heat treating (fluidized beds)  
Hydraulic fluid testing  
Hourglasses  
Mechanical plating  
Optical frame molding  
Packing media in distillation stacks  
Paint grinding  
Point-of-purchase displays  
Polishing  
Printing  
Special reflectorization projects  
Reflectorized signs and markers  
Release mediums  
Scientific apparatus  
Sintering  
Strike surfaces and match beads  
Time-acceleration devices  
Tumbling and vibratory cleaning

**V SERIES**

DESIGNATION	U.S. SIEVES	RANGE INCHES	RANGE MILLIMETERS
V-630		.638-.614	16.2-15.6
V-590		.607-.574	15.4-14.6
V-550		.572-.535	14.5-13.6
V-510		.532-.496	13.5-12.6
V-470		.493-.457	12.5-11.6
V-430		.453-.417	11.5-10.6
V-390		.414-.378	10.5-9.6
V-350		.374-.339	9.5-8.6
V-320		.335-.299	8.5-7.6
V-280		.295-.260	7.5-6.6
V-240		.256-.220	6.5-5.6
V-220	3-1/2- 5	.223-.157	5.66-4.00
V-190	4 - 5	.187-.157	4.76-4.00
V-1607	5 - 6	.157-.132	4.00-3.36
V-160	5 - 7	.157-.111	4.00-2.83
V-130	6 - 8	.132-.094	3.36-2.38
V-110	7 - 10	.111-.079	2.83-2.00
V-080	10 - 14	.079-.056	2.00-1.41
V-070	12 - 18	.066-.039	1.68-1.00
V-040	16 - 20	.047-.033	1.19-.84

**P SERIES**

DESIGNATION	U.S. SIEVES	RANGE INCHES	RANGE MICRONS
P-047	16- 25	.0469-.0278	1190-707
P-0337	20- 30	.0331-.0234	841-595
P-033	20- 35	.0331-.0197	841-500
P-0280	25- 35	.0278-.0197	707-500
P-0230	30- 40	.0234-.0165	595-420
P-020	35- 45	.0197-.0138	500-350
P-0170	40- 50	.0165-.0117	420-297
P-0140	45- 60	.0139-.0098	354-250
P-0120	50- 70	.0117-.0083	297-210
P-010	60- 80	.0098-.0070	250-177
P-008	70-140	.0083-.0041	210-105
P-0080	70-100	.0083-.0059	210-149
P-007	80-120	.0070-.0049	177-125
P-0060	100-140	.0059-.0041	149-105
P-006	100-230	.0059-.0024	149- 62
P-004	minus 140	.0041 & finer	105 & finer

**H SERIES**

DESIGNATION	U.S. SIEVES	RANGE INCHES	RANGE MICRONS
H-0337	20- 30	.0331-.0234	841-595
H-0230	30- 40	.0234-.0165	595-420
H-017	40- 60	.0165-.0117	420-297
H-012	50- 70	.0117-.0083	297-210
H-005	140-200	.0041-.0029	105- 74
H-003	minus 170	.0035 & finer	88 & finer
H-002	minus 200	.0029 & finer	74 & finer

## V SERIES BEADS

(Sizes V-040 through V-240)

Properties	Values
Density (Sp. Gr.)	2.916
Young's Modulus lbs./sq. in.	$7.25 \times 10^6$
Expansion Coeff. (25-300°C) per °C	$87.8 \times 10^{-7}$
Littleton Softening Pt.	631°C
Dilatometer Softening Pt.	502°C
Dilatometer Transformation Pt.	440°C
Coeff. of Friction	dynamic equals 0.7-0.8 static equals 0.9-1.0
Refractive Index 589 m $\mu$ (n <sub>d</sub> )	1.550 plus or minus 0.001
D.C. Vol. Resistivity (ohms x cm) at 25°C	$8.4 \times 10^{14}$
Dielectric Constant 60 cps	7.7
1 Kc	6.9
100 Kc	6.9
Loss Tangent 1 Kc	0.2%
100 Kc	0.2%
Hardness Knoop 100g load	515 kg/mm <sup>2</sup>

NOTE: For properties of Sizes V-280 through V-630,  
see P Series

## H SERIES BEADS

Properties	Values
Density (Sp. Gr.)	4.493
Young's Modulus lbs./sq. in.	$5.94 \times 10^6$
Expansion Coeff. (25-300°C) per °C	$106.1 \times 10^{-7}$
Dilatometer Softening Pt.	594°C
Dilatometer Transformation Pt.	548°C
Coeff. of Friction	dynamic equals 0.7-0.8 static equals 0.9-1.0
Refractive Index 589 m $\mu$ (n <sub>d</sub> )	1.935 plus or minus 0.004
656 m $\mu$ (n <sub>c</sub> )	1.920 approx.
486 m $\mu$ (n <sub>f</sub> )	1.950 approx.
D.C. Vol. Resistivity (ohms x cm) at 25°C	$1.8 \times 10^{14}$
Dielectric Constant 60 cps	19.5
1 Kc	16.8
100 Kc	16.7
Loss Tangent 1 Kc	0.13%
100 Kc	0.13%
Hardness Knoop 100g load	470 kg/mm <sup>2</sup>

## P SERIES BEADS

Properties	Values
Strain Point	505°C
Annealing Point	548°C
Softening Point	730°C
Expansion Coefficient (0-300°C) per °C	$85 \times 10^{-7}$
Specific Gravity	2.46-2.49
Refractive Index	1.51-1.52
Young's Modulus	$10 \times 10^6$ psi
Rigidity Modulus	$4.3 \times 10^6$ psi
Poissons Ratio	0.21
Dielectric Constant 1 Mc at 20°C	7.0-7.6
Power Factor 1 Mc at 20°C	0.004-0.011
Volume Resistivity at 250°C	$10^{6.5}-10^{7.0}$ ohms
Mean Specific Heat	0.18 cal/gm°C at 20°C to 0.28 cal/gm°C at 1000°C
True Specific Heat	0.18 cal/gm°C at 20°C to 0.32 cal/gm°C at 1000°C
Thermal Conductivity	0.002 cal/sec/cm°C at 0°C to 0.0036 cal/sec/cm°C at 500°C
Coefficient of Friction	0.18 to 0.24 (glass on glass)
Dielectric Strength	4500 Kv/cm
Hardness DPH 50g load	540 kg/mm <sup>2</sup>
Knoop 100g load	515 kg/mm <sup>2</sup>
Thermal Diffusivity at Room Temperature	0.005 cm <sup>2</sup> /sec
Emissivity	10% at 2 $\mu$ 58% at 3 $\mu$ 90% at 4.5 $\mu$ 98% at 8 $\mu$ 78% at 9.5 $\mu$ 85% at 12.0 $\mu$
Spectral Emissivity of a 1/8" thick piece	72%
Chemical Durability— Powder Tests In water, 4 hours at 90°C	0.05% Na <sub>2</sub> O extracted
In N/50 H <sub>2</sub> SO <sub>4</sub> , 4 hours at 90°C	0.03% Na <sub>2</sub> O extracted



POTTERS INDUSTRIES INC.

P.O. Box 14, Carlstadt, N.J. 07072

Phone: 201 • 933-3355

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POTTERS INDUSTRIES INC.

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"P" SERIES TECHNICAL QUALITY GLASS BEADS

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GROUP 250

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PRICE LIST

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GROUP 250

Pounds of single shipments

Nominal Size (US Sieve)	1- 24	25- 49	50- 99	100- 249	250- 299	1000- 1999	2000 or more
P-047	16-25		3.00	1.50	.98	.75	.60
P-0337	20-30						
P-033	20-35						
P-0280	25-35		2.82	1.35	.82	.57	.42
P-0230	30-40						
P-020	35-45						
P-0170	40-50						
P-0140	45-60						
P-0120	50-70						
P-010	60-80						
P-008	70-140		2.75	1.29	.72	.50	.38
P-0080	70-100						
P-007	80-120						
P-0060	100-140						
P-006	100-230						
P-004	140 and finer						

1. Freight: F. O. B. Origin.
2. Different sizes of "P" and "V" Series materials may be grouped together for lower quantity prices provided each size ordered is in multiples of 100 lbs. "P" and "V" Series may not, however, be grouped with impact beads or other Potters products for the purpose of obtaining lower prices.
3. Standard packaging is 100 lb. fiber drum with a polyethylene liner.
4. Payment terms are Net 30 days.
5. Minimum order is \$20.00.

## TERMS OF SALE

**CONDITIONS OF SALE:** The sale of all of the Company's products is governed exclusively by the terms and conditions set forth herein. No modification or addition to these terms and conditions, unless specifically agreed to in writing, will be binding upon the Company.

**TERMS:** Net 30 days from date of invoice unless specifically noted otherwise. If at any time, in the opinion of the Company, the financial condition of the purchaser does not justify the continuance of production or the making of further shipments on the terms of payments specified, the Company may withhold further production or shipment until full or part payment, in advance, at its discretion, has been received.

**QUOTATIONS:** Quotations, verbal or written, are subject to the terms and conditions listed herein. Written quotations automatically expire sixty calendar days from the date issued and are in any event subject to withdrawal by either verbal or written notice at any time within that period. Verbal quotations automatically expire seven days from the date issued and are subject to withdrawal by either verbal or written notice at any time within that period.

**CHANGES:** Prices and terms of sale are subject to change without notice.

**ACCEPTANCE OF ORDERS:** All orders are accepted subject to the conditions and terms of the Company in effect at the time of acceptance. To the extent that such terms and conditions are inconsistent with any provisions contained in any customer's order form, these terms and conditions shall govern.

**MINIMUM BILLINGS:** Orders amounting to less than \$20.00 net will be billed at \$20.00.

**TRANSPORTATION:** In all cases the Company reserves the right to select the method and route of shipment. Special routing such as air freight made at the customer's request will be forwarded with the addition of freight charges to the extent that such charges exceed normal truck rates.

**DELIVERY:** The Company will not be liable for any penalty, liquidated or otherwise, for late delivery. All shipping dates are approximate and are in any case dependent upon prompt receipt from the customer of all information necessary for the proper execution of the customer's order. In the event there is any delay in the receipt of such information the date of shipment may, at the Company's option, be extended for a reasonable time, taking into consideration conditions at the Company's factory at such time. The Company shall not be liable for delay in delivery due to acts of God, acts of the purchaser, fires, strikes, floods, epidemics, quarantine restrictions, war, insurrections, riots, actions of civil or military authority, freight embargoes, car shortages, wrecks or delays in transportation, unduly severe weather, inability to obtain necessary labor or materials, or other causes beyond the control of the Company.

**ERRORS:** All stenographic and clerical errors are subject to correction.

**TAXES:** The amount of any present or future sales or any similar tax applicable to the product sold under these terms or conditions shall be added to the prices contained herein and paid by the purchaser in the same manner and with the same effect as if originally added hereto.

**PENALTY CLAUSE:** No penalty clause of any description shall be effective against the Company unless specifically approved in writing by an officer of the Company.

**CANCELLATION:** Following acceptance of an order by the Company, the order may be cancelled only with the Company's written consent.

**MATERIAL RETURNED FOR CREDIT:** In no case is merchandise to be returned to the Company for credit without prior notification to the Company and reasonable opportunity for the Company to inspect the same at the premises of the customer and the receipt of written permission from the Company authorizing such return. Any material returned without prior authorization will remain the property of the sender and the Company shall not be responsible for the same. Material accepted by Company for credit shall be subject to minimum service charge of 10% plus all transportation charges that are borne by the Company. All goods must be securely packed to reach the Company without damage. Any cost incurred by the Company to restore such goods to first class condition will be charged to the customer. In the event the return is caused by defect in the merchandise attributable to the Company and such return is authorized by the Company, full credit will be allowed, including all transportation charges.

**PACKING:** Prices quoted include the Company's standard packing. Packing which varies from the standard will be supplied after a price review.

**PALLETS:** Material will be shipped on standard pallets only upon customer request. Pallets will be invoiced at price noted on order. Credit will be issued for pallets returned prepaid in good condition. Quantity of returned pallets accepted for credit cannot exceed original shipment quantity.

**INSPECTION AND CLAIMS:** All merchandise must be inspected by the customer and all claims with respect to such merchandise must be made to the Company within 30 days after receipt of the merchandise by the customer. No claims of any kind may be made against the Company subsequent to the expiration of such 30 day period. In no event will the Company recognize any claims of any nature after the merchandise has been incorporated into any other product or subject to further processing. Such incorporation or such processing shall be deemed to be a waiver of all claims by the customer.

**WARRANTY:** The Company warrants the merchandise to be free from defects in workmanship and material. The Company's obligation under this Warranty is limited to replacing any part of this merchandise within twelve months from date of purchase after the defective merchandise shall have been returned to the Company's factory or other destination specified by the Company subsequent to inspection of the same at the customer's premises by representatives of the Company.

This warranty is issued in lieu of all other warranties express or implied and the Company does not authorize any representative or other person to assume for the Company any liability in connection with the sale of this merchandise. In no event shall the Company be liable for any consequential or remote damages, loss of profit or other damages of any nature except as expressly warranted herein.

PRODUCTION OF GOODS AND/OR SERVICES SPECIFIED HEREIN COMPLY WITH ALL APPLICABLE REQUIREMENTS OF SECTIONS 6, 7, AND 12 OF THE FAIR LABOR STANDARDS ACT, AS AMENDED, AND REGULATIONS AND ORDERS OF THE UNITED STATES DEPARTMENT OF LABOR, ISSUED UNDER SECTION 14 THEREOF.

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"V" SERIES TECHNICAL QUALITY GLASS BEADS

PRICE LIST

AUG 31 1971

GROUP 250

Pounds of single shipments

Nominal Size (US Sieve)	1-	25-	50-	100-	250-	500 or more
V-630	16mm					
V-590	15mm					
V-550	14mm	4.75	3.58	3.05	2.64	2.52
V-510	13mm					
V-470	12mm					
V-430	11mm					
V-390	10mm					
V-350	9mm	3.90	2.89	2.41	2.06	1.83
V-320	8mm					
V-280	7mm					
V-240	6mm					
V-220	3 1/2-5					
V-190	4-5					
V-1607	5-6					
V-160	5-7	3.75	2.55	2.10	1.75	1.55
V-130	6-8					
V-110	7-10					
V-080	10-14					
V-070	12-18					
V-040	16-20	3.40	2.25	1.80	1.51	1.34
						1.19

1. Freight: F. O. B. Origin.
2. Different sizes of "P" and "V" Series materials may be grouped together for lower quantity prices provided each size ordered is in multiples of 100 lbs. "P" and "V" Series may not, however, be grouped with impact beads or other Potters products for the purpose of obtaining lower prices.
3. Standard packaging is 100 lb. fiber drum with a polyethylene liner.
4. Payment terms are Net 30 days.
5. Minimum order is \$20.00.

## TERMS OF SALE

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**TERMS:** Net 30 days from date of invoice unless specifically noted otherwise. If at any time, in the opinion of the Company, the financial condition of the purchaser does not justify the continuance of production or the making of further shipments on the terms of payments specified, the Company may withhold further production or shipment until full or part payment, in advance, at its discretion, has been received.

**QUOTATIONS:** Quotations, verbal or written, are subject to the terms and conditions listed herein. Written quotations automatically expire sixty calendar days from the date issued and are in any event subject to withdrawal by either verbal or written notice at any time within that period. Verbal quotations automatically expire seven days from the date issued and are subject to withdrawal by either verbal or written notice at any time within that period.

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**TRANSPORTATION:** In all cases the Company reserves the right to select the method and route of shipment. Special routing such as air freight made at the customer's request will be forwarded with the addition of freight charges to the extent that such charges exceed normal truck rates.

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**TAXES:** The amount of any present or future sales or any similar tax applicable to the product sold under these terms or conditions shall be added to the prices contained herein and paid by the purchaser in the same manner and with the same effect as if originally added hereto.

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**WARRANTY:** The Company warrants the merchandise to be free from defects in workmanship and material. The Company's obligation under this Warranty is limited to replacing any part of this merchandise within twelve months from date of purchase after the defective merchandise shall have been returned to the Company's factory or other destination specified by the Company subsequent to inspection of the same at the customer's premises by representatives of the Company.

This warranty is issued in lieu of all other warranties express or implied and the Company does not authorize any representative or other person to assume for the Company any other liability in connection with the sale of this merchandise. In no event shall the Company be liable for any consequential or remote damages, loss of profit or other damages of any nature except as expressly warranted herein.

PRODUCTION OF GOODS AND/OR SERVICES SPECIFIED HEREIN COMPLY WITH ALL APPLICABLE REQUIREMENTS OF SECTIONS 6, 7, AND 12 OF THE FAIR LABOR STANDARDS ACT, AS AMENDED, AND REGULATIONS AND ORDERS OF THE UNITED STATES DEPARTMENT OF LABOR, ISSUED UNDER SECTION 14 THEREOF.